

1. **What is the difference between series and parallel circuit?**

In a series circuit, the current through each of the components is the same, and the voltage across the circuit is the sum of the voltages across each component. In a parallel circuit, the voltage across each of the components is the same, and the total current is the sum of the currents through each component.

2. **How to trace out fault in an electrical circuit?**

Step 1 - Power Down

To trace a short circuit, all the electrical switches should be turned off. All lights and other electric appliances should be unplugged. The tripped circuit breaker should be reset. A replacement should be completed if there is a fuse instead of a circuit breaker.

Step 2 - Check Receptacles or Switches

After resetting the breaker, if it trips again immediately, there is a possibility of a short circuit in a receptacle or a switch.

Step 3 - Narrow it Down

If the circuit breaker does not trip, turn on each switch one at a time until the breaker trips again. When the breaker trips upon turning on a particular switch, it is evident that there is a short circuit in a fixture or receptacle controlled by the switch.

Step 4 - Identify a Particular Electrical Appliance

When the circuit breaker does not trip even after turning all the switches on, then you can conclude that the original problem started with an electrical appliance somewhere inside the home. Return to the electrical appliances and lights and begin plugging them in one by one. As soon as the breaker trips, whichever appliance is plugged in at that moment can be identified as problematic and isolated. The issue could lie in the plug, the cord, or the appliance itself.

3. **How circuit breaker work?**

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit. Its basic function is to interrupt current flow after a fault is detected. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.

4. How fire alarm work and how to check it?

Inspect the smoke alarm visually to ensure that dust and debris aren't blocking the air entry points, and that there's no damage.

Hold and press the button on the smoke alarm, which should release a loud siren. If you do not hear the alarm, or the alarm sound is quiet, you may need to replace the batteries. If the alarm still doesn't work after a battery replacement, exchange the entire unit.

It may be a good idea to ask a family member to walk around the home while you're testing the alarm to ensure that it can be heard from every point in the property. The same technique can apply to business premises.

Make sure that the smoke alarm is working by presenting it with actual smoke. Though the button can test whether the batteries are working, placing 2 or 3 lighted matches underneath the unit can ascertain whether it's performing its primary function.

5. What Navigation light is? And describe the working principle of navigation light?

A navigation light, also known as a running or position light, is a source of illumination on a vessel, aircraft or spacecraft. Navigation lights give information on a craft's position, heading, and status. Their placement is mandated by international conventions or civil authorities.

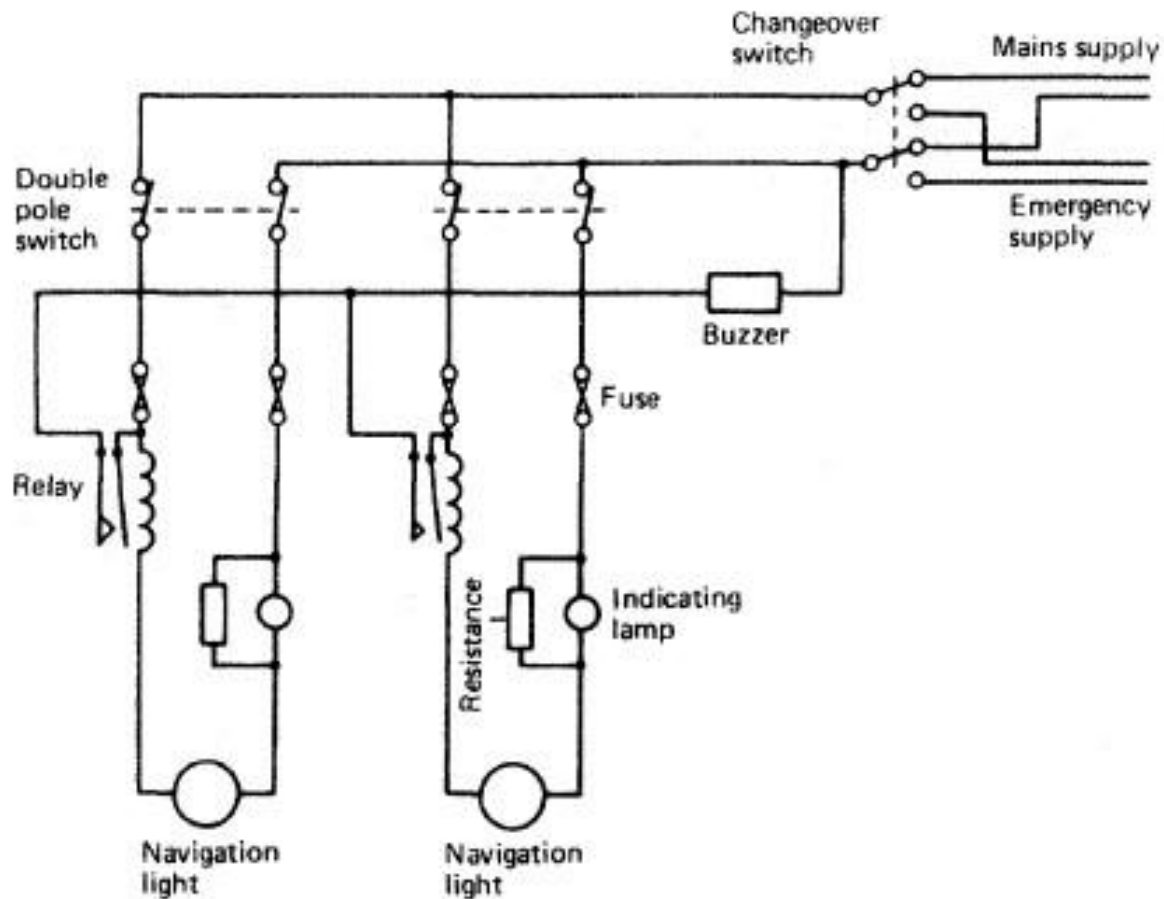
Navigation lights are not intended to provide illumination for the craft making the passage, only for other craft to be aware of it.

Operational guidance for ships navigational light circuit

The supply to the navigation lights circuit must be maintained under all circumstances and special provisions are therefore made. To avoid any possibility of accidental open circuits the distribution board for the navigation lights supplies no other circuit. A changeover switch provides an alternative source of supply should the main supply fail. If the navigation lights fail, a visual or audible indication must be given.

A navigation lights circuit is shown in Figure. Two sources of supply are available from the changeover switch. A double pole switch connects the supply to each light circuit, with a fuse in each line. A relay in the circuit will operate the buzzer if an open circuit occurs, since the relay will de-energise and the trip bar will complete the buzzer circuit. A resistance in series with the indicating lamp will ensure the navigation lights operate even if the indicating lamp fails.

A main supply failure will result in all the indicating lamps extinguishing but the buzzer will not sound. The changeover switch will then have to be moved to the alternative supply.



6. How many types of navigation lights in the ship?

Navigation lights help you and other boaters determine which is the give-way vessel when encountering each other at night. These lights must be displayed from sunset to sunrise and during periods of restricted visibility, such as fog. There are four common navigation lights.

Sidelights: These red and green lights are called sidelights (also called combination lights) because they are visible to another vessel approaching from the side or head-on. The red light indicates a vessel's port (left) side; the green indicates a vessel's starboard (right) side.

Sternlight: This white light is seen only from behind or nearly behind the vessel.

Masthead Light: This white light shines forward and to both sides and is required on all power-driven vessels. (On power-driven vessels less than 39.4 feet in length, the masthead light and sternlight may be combined into an all-round white light; power-driven vessels 39.4 feet in length or longer must have a separate masthead light.) A masthead light must be displayed by all vessels when under engine power. The absence of this light indicates a sailing vessel because sailboats under sail display only sidelights and a sternlight.

All-Round White Light: On power-driven vessels less than 39.4 feet in length, this light may be used to combine a masthead light and sternlight into a single white light that can be seen by other vessels from any direction. This light serves as an anchor light when sidelights are extinguished.

7. How to turn emergency generator on load?

Procedure for Battery Start

- a. Go to the emergency generator room and find the panel for emergency generator.
- b. Put the switch on the test mode from automatic mode. The generator will start automatically but will not come on load.
- c. Check voltage and frequency in the meter.
- d. Keep the generator running for 10-15 min and check the exhaust temp and other parameters.
- e. Check the sump level.
- f. For stopping the generator, put the switch in manual and then stop the generator.

Procedure for Hydraulic Start

- g. Put the switch in manual mode as stated above and check the pressure gauge for sufficient oil pressure.
- h. Open the valve from accumulator to generator.
- i. Push the spring loaded valve and the generator should start.
- j. Check voltage and frequency.
- k. Keep the generator running for 10-15 min and check the exhaust temp and other parameters.
- l. Check the sump level
- m. For stopping, use the manual stop button from the panel.
- n. After stopping the generator, pressurize the hydraulic accumulator to desired pressure.



- o. Close the valve from accumulator to generator.

Procedure for Automatic Start

- p. For automatic start, we know that there is a breaker which connects Emergency Switch Board (ESB) and Main Switch Board (MSB); and there is also an interlock provided due to which the emergency generator and Main power of the ship cannot be supplied together.
- q. Therefore, we simulate by opening the breaker from the tie line, which can be done from the MSB or the ESB panel.
- r. After opening the breaker, the emergency generator starts automatically with the help of batteries and will supply essential power to machinery and pumps connected to ESB.
- s. For stopping the generator, the breaker is closed again and due to the interlock the generator becomes off load.
- t. Now again put the switch to manual mode to stop the generator.
- u. Press stop and the generator will stop.

8. What does synchronization means?

In an alternating current electric power system, synchronization is the process of matching the speed and frequency of a generator or other source to a running network. An AC generator cannot deliver power to an electrical grid unless it is running at the same frequency as the network. If two segments of a grid are disconnected, they cannot exchange AC power again until they are brought back into exact synchronization.

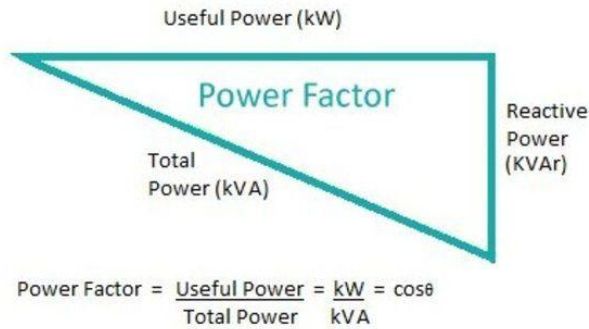
9. What is current, voltage and resistance?

- **Voltage** is the difference in charge between two points.
- **Current** is the rate at which charge is flowing.
- **Resistance** is a material's tendency to resist the flow of charge (current).

10. What is power factor and what does its importance?

Power Factor is very important for every power system or company, because it helps in maintaining inductive load. As its values lies in between 0–1.

Any system which has a power factor close to 1 is considered as good or excellent system, whereas any system which has a power factor close to 0 (Like 0.2, 0.3, 0.4, 0.5, 0.6) is considered as bad system and that power company have to pay something as a penalty fee. Because



whenever power factor is not good or lagging power factor then imposes a severe impact on power supplying side.

You can see in above formula that when P.F is low then Apparent power or total power increases, it means Power supplying company has to provide more power to that company which has low P.F & this increases the line current which has a bad impact on the conductors or cables through which

power is flowing, conductors becomes hot and heat dissipation will high, which causes a power supplying company to produce more power in order to compensate the power demand, their production cost of power will be increase and equipment cost also increases. So it is better to have a good P.F, in order to avoid penalty and other things.

11. What is fire and its types?

This is The Fire Triangle. Actually, it's a tetrahedron, because there are four elements that must be present for a fire to exist. There must be oxygen to sustain combustion, heat to raise the material to its ignition temperature, fuel to support the combustion and a chemical reaction between the other three elements. Remove any one of the four elements to extinguish the fire. The concept of Fire Protection is based upon keeping these four elements separate.

Types of Fires

Not all fires are the same. Per NFPA 10, burning may be classified into one or more of the following fire classes and your fire protection specialist will select the right fire extinguisher size and agent for the hazard.



- Class A fires are fires in ordinary combustibles such as wood, paper, cloth, rubber, and many plastics.
- Class B fires are fires in flammable liquids such as gasoline, petroleum greases, tars, oils, oil-based paints, solvents, alcohols. Class B fires also include flammable gases such as propane and butane. Class B fires do not include fires involving cooking oils and grease.
- Class C fires are fires involving energized electrical equipment such as computers, servers, motors, transformers, and appliances. Remove the power and the Class C fire becomes one of the other classes of fire.

- Class D fires are fires in combustible metals such as magnesium, titanium, zirconium, sodium, lithium, and potassium.
- Class K fires are fires in cooking oils and greases such as animal and vegetable fats.

Some types of fire extinguishing agents can be used on more than one class of fire. Others have warnings where it would be dangerous for the operator to use on a particular fire extinguishing agent.

12. How to test smoke detector?

Press and hold the test button on the smoke detector. It can take a few seconds to begin, but a loud, ear-piercing siren should emanate from the smoke detector while the button is pressed. If the sound is weak or nonexistent, replace your batteries. If it has been more than six months since you last replaced the batteries (whether your detector is battery-powered or hardwired), change them now regardless of the test result, and test the new batteries one final time to help ensure proper functioning. You should also look at your smoke detector to make sure there's no dust or other substance blocking its grates, which may prevent it from working even if the batteries are new.